

CLAIMS

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

- 1 1. A method of measuring overlay alignment of
2 sequential lithographic exposures, said method
3 including steps of
4 forming first separated features on a
5 surface,
6 forming second separated features on said
7 surface interleaved between said first separated
8 features, and
9 illuminating said first and second separated
10 features and detecting an interference pattern.
- 1 2. A method as recited in claim 1, including the
2 further step of calculating a spectrographic
3 response corresponding to said interference
4 pattern.
- 1 3. A method as recited in claim 1, wherein said
2 illuminating and detecting step is performed with
3 a specular spectroscopic scatterometer.
- 1 4. A method as recited in claim 3 wherein said
2 scatterometer is of the reflectometer type.
- 1 5. A method as recited in claim 3 wherein said
2 scatterometer is of the ellipsometer type.
- 1 6. A method as recited in claim 5, wherein said
2 ellipsometer measures complex reflectivity
3 spectral ratio for two orthogonal polarizations
4 with broadband illumination.

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1 7. A method as recited in claim 1 wherein said
2 illumination is broadband light.

1 8. A method as recited in claim 1 wherein said
2 detection measures amplitude and phase.

1 9. A method as recited in claim 1, wherein said
2 illumination and detection step results in
3 measured spectral curves and including the further
4 steps of

5 modelling said first and second features by
6 simulation to obtain simulated spectral curves,
7 and
8 comparing said measured spectral curves with
9 said simulated spectral curves.

1 10. A method as recited in claim 9, wherein said
2 comparing step includes use of an optimization
3 technique to determine best fit and to quantify a
4 misalignment value.

1 11. A test mark including
2 a plurality of marks formed by a lithographic
3 exposure,
4 a mark formed between said plurality of marks
5 by another lithographic exposure,
6 said mark and said plurality of marks forming
7 a periodic structure.

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1 12. A non-imaging metrology apparatus comprising
2 means for storing spectral curves,
3 a specular spectroscopic scatterometer for
4 measuring reflection from a plurality of marks
5 formed by two lithographic exposures and forming a
6 periodic structure, and
7 means for comparing processed signals output
8 from said specular spectroscopic scatterometer
9 with said spectral curves to evaluate misalignment
10 of said two lithographic exposures.

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